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Exploring Trade Relationship between Malaysia and the OIC Member Countries: A Panel Cointegration Approach (1995-2012)

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ABSTRACT

The main objective of this study is to explore the long-run and short-run relationship between trade and other macroeconomic variables of Malaysia and the OIC member countries. To test relationship between trade and other macroeconomic variables, the empirical investigation will be conducted based on the Fully Modified Ordinary Least Squares (FMOLS) model for the period of 1995-2012. Results of FMOLS shows that out of all the variables included in the model, per capita GDP, foreign direct investment and real exchange rate of Malaysia have significant effect on the trade. The ECM panel unit root test were applied to confirm the stability of FMOLS. According to the unit root test of the residuals of FMOLS model without trend and intercept formation, it can be confirmed that the long run results are not spurious. Results of panel ECM show that none of the variable effect on trade between Malaysia and OIC countries. Finally, results of Granger Causality show that consumer price index, per capita GDP of Malaysia and foreign direct investment of OIC countries are causing trade between Malaysia and OIC countries.

Key words: International trade, FMOLS, panel data, Malaysia

INTRODUCTION

International trade has always been playing a crucial role in the process of growth and development in Malaysia, especially in transforming the economy from a low income to upper-middle income category. Traditionally, Malaysia's major trading partners were the United States of America, the European Union (EU) and Japan but this trend has been shifted somewhat primarily due to the 2008/09 world economic and financial crises. In 2009 for example, Malaysia's major exporting and importing nations have tilted more towards other new markets and non-traditional countries such as China (MITI., 2009). In response to the crises, the Malaysian government, under the New Economic Model (NEM), has embarked on a new strategy to shift its trade dependency on the traditional markets and exploring new markets for exports and imports. Under NEM, one of the markets being targeted is the Middle Eastern countries.

The prospects and opportunities in forging a closer and deeper regional economic co-operation under OIC, particularly with the rich Arab countries are yet to be fully tapped especially through the means of trade Abidin, Jantan and Satar. Furthermore, the 2008/09 world economic and financial crisis and in the aftermath of the September 11 terrorist attack have made the trade relationship between Malaysia and the OIC countries becoming more relevant than ever especially in the sphere of economic cooperation. It is therefore, crucial to examine and analyze the on-going Malaysia-OIC trade relationship in this context.

The encouragement of trade between OIC countries has long been well thought-out as the fundamental for collaboration and economic integration. As with studies of OIC international trade capacity, empirical studies on OIC countries' international trade as a group also inadequate.

Numerous studies such as Ekholm *et al.* (1996), Bendjilali (1997), Al-Atrash and Yousef (2000), Nugent and Miniesy (2005), Ghani (2007) and Abu-Hussin (2010) have pay attention on the Middle East and North African (MENA) region, which embrace the immensity of OIC members. Moreover (Hassan, 1998; Gundogdu, 2009) focused on South Asian Association for Regional Cooperation (SAARC). The proposed studies on MENA and OIC countries illustrate that trade dimensions for countries in these regions are small and categorize the small intensity of trade related services, a lack of trade related information, the subsistence of tariff and non-tariff obstacle, and vacant of trade structures as barriers to regional cooperation and trade. These countries' unbalanced and contracted exports bases also offer slight encouragement to prospective regional partners in term of ascertain long-term economic associations.

Additionally, these OIC members' countries reliance on non-OIC members' countries for imports and exports. The study of Ekholm *et al.* (1996) use cross-sectional data for 11-developing countries and 13-industrial countries and argue that impending for trade growth inside the MENA regions, even with the more peaceful countries and the European Union (EU) is small. The study of Bendjilali (1997) explore the situation of intra-trade between OIC member countries by using gravity model. The results of the study shows that trade of OIC countries positively exaggerated by the size of their economies, the degree of IDB trade financing and their mutual involvement in regional integration schemes. While trade of OIC countries negatively affected by communication and transportation costs as proxy for the distance factor which constitutes a significant barrier to trade among OIC countries.

The study of Ghani (2007) also explore the scope of economic integration between five members of the Arab States (LAS) and include five of their major partners; the results show that the LAS economic alliance has not been effectual in cause trade growth, representing a collapse of its members to instate integrative procedures. Meanwhile, Hassan (1998) examines the role of exports towards development in SAARC countries. He argue that SAARC countries need trade rectification to boost trade among them because the size of trade between SAARC countries is small as compare to trade with non-SAARC countries.

Abu-Hussin (2010) analyzed Malaysia's trade relations with the Gulf Cooperation Council (GCC) countries which consist of the United Arab Emirates (UAE), Bahrain, Saudi Arabia, Oman, Qatar and Kuwait. Using trade intensity index, they showed that Malaysia's trade with the individual GCC country and with GCC as a group were very low during the 1990-2007 period of study. They provided suggestions on how to improve Malaysia-GCC trade relations in the future such as to expedite the Free Trade Agreement (FTA) initiative and focusing on niche areas which they have comparative advantage at such as Halal Food services, Islamic Banking and Finance services, tourism sector, bio-fuel industries, constructions, education sector and petrochemical industries.

However, Devadason *et al.* (2014) find that based on their gravity model estimation, culture and religion are insignificant in enhancing bilateral trade between Malaysia and the GCC countries. By using a qualitative method of semi-structured interviews, Abu-Hussin (2010) has arrived into the same conclusion that religious affinity does not help in terms promoting business relations of Malaysia-GCC countries. He also explored the trade relationship between Malaysia and the Gulf Cooperation Council (GCC) countries by employing the Revealed Comparative Advantage

(RCA) and the trade intensity index. Through these analyses, he discovered that the trade linkages are still insignificant relative to Malaysia's traditional trading partners. Ismail (2008), on the other hand, examined the pattern of trade between Malaysia and eighty trading partners, where twenty of which are OIC members. In his study, he found that Malaysia trade with countries which have similar in terms of size but different in terms of factor endowment.

Abidin *et al.* (2013) showed that as the economic integration increases, trade barriers or forms of protectionism, such as tariffs, non-tariff restrictions, import quotas, government regulations, etc., would decrease. Studies specifically addressed on the issue of the establishment of the Islamic Common Market (ICM) as a long term goal for OIC are still scarce. but there are some studies which supported the establishment of the ICM (Hassan and Islam, 2001; Hassan *et al.*, 2010; Laldin, 2008; Rahman *et al.*, 2010; Zeinelabdin and Ugurel, 1998).

Hassan (1998) proposed that the establishment of the Islamic Common Market (ICM) is a step in the right direction and the way forward for the OIC member countries to enhance their trade relationship in the long term. Hassan *et al.* (2010) showed that the OIC is now heading in the right direction as far as the establishment of the ICM is concerned. But they warned that the major impediment for the materialization of the ICM was a lack of political commitment among the member countries.

Over the recent years, Malaysia-OIC trade relationship is relatively small compared with Malaysia's trade with the rest of the world although it has shown an increasing pattern. In 2007 for example, Malaysia's total trade with the OIC member countries accounted only 8.37% of its total global trade (Ilias, 2008). The detail can be seen in Fig. 1.

Overall, Malaysia's trade with the OIC member countries for the years 1998, 2003, 2005 and 2006 are USD 6.6 billion, USD 10.4 billion, USD 20.6 billion and USD 22.9 billion, respectively. On the other hand, Malaysia's trade with non-OIC countries amounted at USD 125.2 billion, USD 209.6 billion, USD 266.4 billion and USD 268.2 billion, respectively for the years 1998, 2003, 2005, and 2006. Considering that the OIC countries have more than 60% of vital resources and with 1.3 billion or one-sixth of the world's population, this general picture of the state of OIC trade performance can be deemed as weak. Although, there are many factors responsible for the weaknesses of this trade relation, the leaders and the people of the OIC countries believe that there are many fields and opportunities for growth of mutual trade relations. Malaysia's major trading partner in the OIC region, on the other hand, can be seen in Table 1.

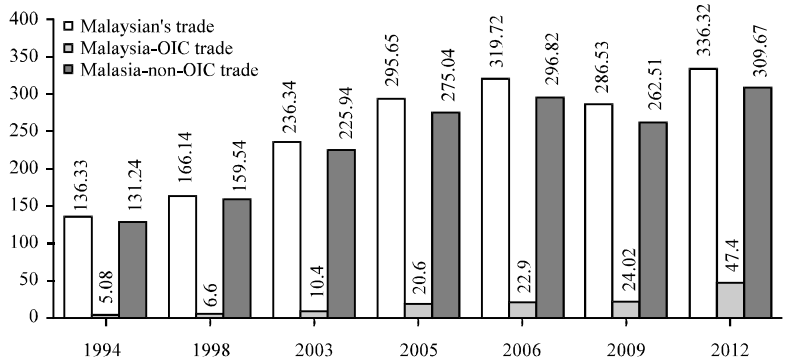

Fig. 1: Malaysia-OIC trade for the year 1994, 1998, 2003, 2005, 2006, 2009 and 2012

Table 1: OIC member countries trade with Malaysia, selected years and countries (USD in Millions)

	Year								
Country	1990	1994	1997	1999	2001	2003	2006	2009	2012
Indonesia	658.30	1656.62	2688.96	2987.91	3804.49	5068.16	9025.81	11478.91	19042.42
Saudi Arabia	297.22	491.30	659.39	588.07	977.73	991.84	2860.09	1920.25	3682.13
U.A.E.	211.59	527.90	765.96	836.95	997.29	1415.32	3238.67	4590.91	8040.64
Pakistan	274.20	726.58	665.30	569.52	443.15	715.95	902.22	1782.24	2105.77
Turkey	101.90	338.06	461.25	332.96	409.91	361.63	702.62	590.52	1024.58
Brunei	86.16	293.54	297.80	224.88	278.01	349.46	421.09	510.33	746.36
Iran	91.00	104.31	139.11	137.08	327.48	428.37	1022.60	1010.00	1482.59
Qatar	21.16	20.21	36.81	32.27	77.12	53.43	266.12	881.00	1581.91
Bangladesh	49.43	80.63	196.54	140.74	186.62	335.37	445.03	830.62	1584.53
Egypt	132.15	195.78	229.78	323.21	219.77	477.92	390.94	844.87	1255.96
Jordan	112.33	117.25	168.71	104.26	91.48	108.91	208.48	175.28	242.10
Yemen	50.99	49.23	56.52	86.73	346.07	316.74	314.47	277.52	211.00

Direction of trade statistics, International monetary fund, Retrieved on 9 April 2013 at http//:www.imfstatistics.org/dot

Table 1 indicates that among Malaysia's major trading partners in the OIC are Indonesia, Saudi Arabia, U.A.E., Pakistan, Turkey and Brunei. Overall, the trade performance in terms of value between Malaysia and the OIC member countries has shown an increasing trend. Malaysia's trade with Indonesia for example has increased substantially from USD 2,688.96 million in 1997 to USD 11,478.91 million in 2009. This sharp increase in trade volume between these two countries from 1995-2012 is due to factors such as common language, cultural affinity, historical backgrounds and similar borders.

Trade among 55-OIC countries is one of the pillars for cooperation and economic integration. In addition, bilateral trade among OIC member countries has been week despite all the efforts engaged by the concerned countries. Generally, the empirical work on OIC member countries has been of a descriptive nature. This study departs from the general practice and studies the Malaysia-OIC trade using Fully Modify Ordinary Least Square (FMOLS). It examines the trade (import+export) among Malaysia-OIC member countries and main macroeconomic variables. Table 2 presented trade/GDP ratio of 55-OIC countries. Among 55-OIC countries Guyana rank 1st, Malaysia rank 16th and Pakistan rank 54th with trade/GDP 197.77, 94.25 and 33.06% accordingly.

MATERIALS AND METHODS

The main objective of this study is to explore the long-run and short-run relationship of trade and other macroeconomic variables of Malaysia and OIC-countries. To test relationship between trade and other macroeconomic variables mainly Fully Modified Least Square (FMOLS) were applied but six different steps were performed to complete the procedure of this model. First, test of stationarity and order of integration among all variables. The study used panel unit root test proposed by Maddala and Wu (1999), Levin *et al.* (2002) and Im *et al.* (2003) to determine the stationarity and order of integration. Second, with the assumption that all the variables are in same order of integration stationary at level I (0) or stationary at first difference I (1) Kao panel cointegration proposed by Kao (1999) has been applied to confirm the residual based cointegration among all variables. These tests involve procedures that are designed to detect the presence of a unit root in the residuals of (cointegrating) regressions among the levels of panel data. Third, Fully

Table 2: Trade/GDP ratio of 55-OIC countries

Rank	Country	Trade/GDP (%)	Rank	Country	Trade/GDP (%)
1	Guyana	197.77	28	Morocco	74.08
2	Maldives	167.11	29	Syria	74.05
3	United Arab Emirates	133.77	30	Togo	73.53
4	Bahrain	133.41	31	Yemen	73.30
5	Jordan	128.46	32	Gambia	72.46
6	Kyrgyzstan	119.36	33	Suriname	68.77
7	Turkmenistan	116.43	34	Senegal	68.53
8	Mauritania	109.46	35	Algeria	68.46
9	Brunei	105.13	36	Uzbekistan	68.18
10	Djibouti	98.96	37	Lebanon	67.71
11	Tunisia	97.19	38	Guinea	67.50
12	Iraq	95.97	39	Nigeria	66.21
13	Tajikistan	95.34	40	Mali	65.11
14	Libya	94.75	41	Comoros	57.03
15	Azerbaijan	94.40	42	Cameroon	55.22
16	Malaysia	94.25	43	Indonesia	54.62
17	Qatar	91.73	44	Egypt	54.43
18	Kuwait	90.38	45	Nigeria	54.30
19	Gabon	90.09	46	Iran	54.29
20	Oman	89.18	47	Turkey	50.49
21	Cote D'ivoire	88.61	48	Sierra Leone	48.44
22	Chad	88.22	49	Benin	46.35
23	Kazakhstan	87.50	50	Guinea-Bissau	45.94
24	Afghanistan	83.47	51	Bangladesh	43.86
25	Saudi Arabia	82.99	52	Burkina Faso	39.67
26	Mozambique	80.97	53	Sudan	37.90
27	Albania	77.24	54	Pakistan	33.06
			55	Somalia	Data not available

Data for this table has been taken from World Bank data base 2013 and author made ranking by himself

Modify Ordinary Least Square (FMOLS) proposed by Pedroni (2001) has been applied to explore the long run relationship between Malaysian export and other variables. Fourth, to confirm that the long run results are not spurious study will applied unit root tests of the residuals of FMOLS model without trend and intercept formation. Fifth, panel Error Correction Model (penal ECM) used to find out short run relationship between all the variables. Finally, after confirm long-run and short-run relationship panel Granger causality will applied to access the direction of causality among all variables.

Panel unit root test: In the previous literature the unit root tests for the individual time series data (Dickey and Fuller, 1979; Engle and Granger, 1987; Phillips and Perron, 1988) are suffering with several problems. One of the main problems is to have low power against the alternative of stationarity of the series, especially if the sample size is small. Panel unit root test have several advantages, it is provide large no of point data, increase the value of degree of freedom and reduce multicollinearity between the two regressors. Moreover, panel unit root test provide us more powerful test statistics asymptotically follow a normal distribution. In this study, Maddala and Wu (1999) known as MW test, Levin *et al.* (2002) known as LLC test and Im *et al.* (2003) known as IPS test are used. The IPS test is based on the following model:

$$\Delta X_{it} = \alpha_i + \beta_i X_{i,t-1} + \sum_{k=1}^{n_i} \rho_{ij} \quad (1)$$

$$\Delta X_{i,t-j} + \varepsilon_{it} \; i = 1,...,N, \; t = 1,...,T \quad (2)$$

where, Δ is the first difference, X_{it} is the series for Malaysia in the current penal in the time period t, n_i is the No. of lags and ε_{it} is the distributed random variables.

Panel cointegration approach: The two non-stationary series with the some linear combination said to be cointegrated. In the second step study will applied panel cointegration test proposed by Kao (1999) for the null hypothesis of no cointegration in homogenous and heterogeneous panels. Assumed all variables are I(1), study apply panel cointegration using Kao (1999) tests. The panel cointegration can be demonstrated as following:

$$X_{it} = \alpha_i + Y_{it}\beta + \omega_{it} \quad (3)$$

where, i = 1,... ..,N, t = 1,... ..,T, ε_i = individual constant term, β = slop parameter, ω_i = stationary distribution, X_{it} and Y_{it} = integrated process of order I(1) for all. Kao (1999) derives two (DF and ADF) types of panel cointegration tests. Both tests can be calculated from:

$$\varpi_{it} = \rho\varpi_{it-1} + V_{it} \quad (4)$$

and

$$\varpi_{it} = \rho\varpi_{it-1} + \sum_{j=1}^{\rho} \varphi_j \Delta\varpi_{it-j} + V_{it} \quad (5)$$

where, ϖ_{it-1} obtained from Eq. 2. For null hypothesis H_0: $\rho = 1$ and alternative hypothesis H_1: $\rho \angle 1$ is used. Kao (1999) propose four DF-type statistics. The first two DF statistics are based on assuming strict exogeneity of the regressors with respect to the error in the equation, while the remaining allow for endogeneity.

Fully Modify Ordinary Least Square (FMOLS): The strong evidence allows us to apply FMOLS to confirm the long run relationship among proposed variables. The panel FMOLS have numerous advantages. It allows Serial Correlation (SE), Existence of Endogeneity (EE) and cross sectional heterogeneity. Moreover, it will propose both within dimension and between dimensions. Let Eq. 2, can obtain the between-dimension Eq. 6:

$$\varpi_{GFM} = N^{-1}\sum_{i=1}^{N}\left[\sum_{t=1}^{T}(X_{it} - X'_i)^2\right]^{-1}\left[\sum_{t=1}^{T}(X_{it} - X'_i)Y'_{it} - Tr'_i\right] \quad (6)$$

Where:

$$\varpi_{GFM} = N^{-1}\sum_{i=1}^{N} \varpi_{FMi}.\varpi_{FMi}$$

is the FMOLS estimator for individual variable.

Panel Error Correction Model (Panel ECM): Furthermore, study applied panel ECM to explore the short-run relationship among the proposed variables. The study specify panel ECM as follows:

$$\begin{aligned}\Delta \ln Trade_{it} = {} & \mu_i + \sum_{j=1}^{11}\delta_j D_{jit} + \sum_{j=1}^{p}\phi_{1j}\Delta \ln PCGDP_{it-j} + \sum_{j=0}^{p}\varphi_{2j}\Delta \ln PCGDP_{jt-j} + \\ & \sum_{j-1}^{p}\varphi_{3j}\Delta \ln CPI_{it-j} + \sum_{j-0}^{p}\varphi_{4j}\Delta \ln CPI_{jt-j} + \sum_{j-0}^{p}\varphi_{5j}\Delta \ln ER_{it-j} + \sum_{j-0}^{p}\varphi_{6j}\Delta \ln ER_{jt-j} + \\ & \sum_{j-0}^{p}\varphi_{7j}\Delta \ln FDI_{it-j} + \sum_{j-0}^{p}\varphi_{8j}\Delta \ln FDI_{jt-j} + \lambda\varepsilon_{it-1}\end{aligned} \tag{7}$$

Panel causality: In the next step study investigate the direction of causality between variables in panel model. According to Engle and Granger (1987) if there are two non-stationary variables are cointegrated, VAR in first difference not be specified. If there is found long-run equilibrium relationship among all variables then study can test Granger causality with the specified model. The Granger causality test is based on the following regressions.

Trade causality:

$$\begin{aligned}\Delta Trade_{ijt} = {} & C_{1i} + \sum_{p}\varphi_{11ip}\Delta \ln PCGDP_{it-p} + \sum_{p}\varphi_{12ip}\Delta PCGDP_{jt-p} + \sum_{p}\varphi_{13ip}\Delta CPI_{it-p} + \sum_{p}\varphi_{14ip}\Delta CPI_{jt-p} \\ & + \sum_{p}\varphi_{15ip}\Delta ER_{it-p} + \sum_{p}\varphi_{16ip}\Delta ER_{jt-p} + \sum_{p}\varphi_{17j}\Delta FDI_{it-p} + \sum_{p}\varphi_{18j}\Delta FDI_{jt-p} + \mu_{1i}ECT_{it-1} + \varepsilon_{1t}\end{aligned} \tag{8}$$

$PCGDP_i$ causality:

$$\begin{aligned}\Delta PCGDP_{it} = {} & C_{2i} + \sum_{p}\varphi_{21ip}\Delta \ln Trade_{ijt-p} + \sum_{p}\varphi_{22ip}\Delta PCGDP_{jt-p} + \sum_{p}\varphi_{23ip}\Delta CPI_{it-p} + \sum_{p}\varphi_{24ip}\Delta CPI_{jt-p} \\ & + \sum_{p}\varphi_{25ip}\Delta ER_{it-p} + \sum_{p}\varphi_{26ip}\Delta ER_{jt-p} + \sum_{p}\varphi_{27j}\Delta FDI_{it-p} + \sum_{p}\varphi_{28j}\Delta FDI_{jt-p} + \mu_{2i}ECT_{it-1} + \varepsilon_{2t}\end{aligned} \tag{9}$$

$PCGDP_j$ causality:

$$\begin{aligned}\Delta PCGDP_{jt} = {} & C_{3i} + \sum_{p}\varphi_{31ip}\Delta \ln Trade_{ijt-p} + \sum_{p}\varphi_{32ip}\Delta PCGDP_{it-p} + \sum_{p}\varphi_{33ip}\Delta CPI_{it-p} + \sum_{p}\varphi_{34ip}\Delta CPI_{jt-p} \\ & + \sum_{p}\varphi_{35ip}\Delta ER_{it-p} + \sum_{p}\varphi_{36ip}\Delta ER_{jt-p} + \sum_{p}\varphi_{37j}\Delta FDI_{it-p} + \sum_{p}\varphi_{38j}\Delta FDI_{jt-p} + \mu_{3i}ECT_{it-1} + \varepsilon_{3t}\end{aligned} \tag{10}$$

CPI_i causality:

$$\Delta CPI_{it} = C_{4i} + \sum_p \varphi_{41ip}\Delta \ln Trade_{ijt-p} + \sum_p \varphi_{42ip}\Delta PCGDP_{it-p} + \sum_p \varphi_{43ip}\Delta PCGDP_{jt-p} + \sum_p \varphi_{44ip}\Delta CPI_{jt-p} + \sum_p \varphi_{45ip}\Delta ER_{it-p} + \sum_p \varphi_{46ip}\Delta ER_{jt-p} + \sum_p \varphi_{47j}\Delta FDI_{it-p} + \sum_p \varphi_{48j}\Delta FDI_{jt-p} + \mu_{4i}ECT_{it-1} + \varepsilon_{4t} \quad (11)$$

CPI_j causality:

$$\Delta CPI_{jt} = C_{5i} + \sum_p \varphi_{51ip}\Delta \ln Trade_{ijt-p} + \sum_p \varphi_{52ip}\Delta PCGDP_{it-p} + \sum_p \varphi_{53ip}\Delta PCGDP_{jt-p} + \sum_p \varphi_{54ip}\Delta CPI_{it-p} + \sum_p \varphi_{55ip}\Delta ER_{it-p} + \sum_p \varphi_{56ip}\Delta ER_{jt-p} + \sum_p \varphi_{57j}\Delta FDI_{it-p} + \sum_p \varphi_{58j}\Delta FDI_{jt-p} + \mu_{5i}ECT_{it-1} + \varepsilon_{5t} \quad (12)$$

ER_i causality:

$$\Delta ER_{it} = C_{6i} + \sum_p \varphi_{61ip}\Delta \ln Trade_{ijt-p} + \sum_p \varphi_{62ip}\Delta PCGDP_{it-p} + \sum_p \varphi_{63ip}\Delta PCGDP_{jt-p} + \sum_p \varphi_{64ip}\Delta CPI_{it-p} + \sum_p \varphi_{65ip}\Delta CPI_{jt-p} + \sum_p \varphi_{66ip}\Delta ER_{jt-p} + \sum_p \varphi_{67j}\Delta FDI_{it-p} + \sum_p \varphi_{68j}\Delta FDI_{jt-p} + \mu_{6i}ECT_{it-1} + \varepsilon_{6t} \quad (13)$$

ER_j causality:

$$\Delta ER_{jt} = C_{7i} + \sum_p \varphi_{71ip}\Delta \ln Trade_{ijt-p} + \sum_p \varphi_{72ip}\Delta PCGDP_{it-p} + \sum_p \varphi_{73ip}\Delta PCGDP_{jt-p} + \sum_p \varphi_{74ip}\Delta CPI_{it-p} + \sum_p \varphi_{75ip}\Delta CPI_{jt-p} + \sum_p \varphi_{76ip}\Delta ER_{it-p} + \sum_p \varphi_{77ip}\Delta FDI_{it-p} + \sum_p \varphi_{78ip}\Delta FDI_{jt-p} + \mu_{7i}ECT_{it-1} + \varepsilon_{7t} \quad (14)$$

FDI_i causality:

$$\Delta FDI_{it} = C_{8i} + \sum_p \varphi_{81ip}\Delta \ln Trade_{ijt-p} + \sum_p \varphi_{82ip}\Delta PCGDP_{it-p} + \sum_p \varphi_{83ip}\Delta PCGDP_{jt-p} + \sum_p \varphi_{84ip}\Delta CPI_{it-p} + \sum_p \varphi_{85ip}\Delta CPI_{jt-p} + \sum_p \varphi_{86}ip\Delta ER_{it-p} + \sum_p \varphi_{87j}\Delta ER_{jt-p} + \sum_p \varphi_{88j}\Delta FDI_{jt-p} + \mu_{8i}ECT_{it-1} + \varepsilon_{8t} \quad (15)$$

FDI_j causality:

$$\Delta FDI_{jt} = C_{9i} + \sum_p \varphi_{91ip}\Delta \ln Trade_{ijt-p} + \sum_p \varphi_{92ip}\Delta PCGDP_{it-p} + \sum_p \varphi_{93ip}\Delta PCGDP_{jt-p} + \sum_p \varphi_{94ip}\Delta CPI_{it-p} + \sum_p \varphi_{95ip}\Delta CPI_{jt-p} + \sum_p \varphi_{96}ip\Delta ER_{it-p} + \sum_p \varphi_{97j}\Delta ER_{jt-p} + \sum_p \varphi_{98j}\Delta FDI_{it-p} + \mu_{9i}ECT_{it-1} + \varepsilon_{9t} \quad (16)$$

All variables are previously defined but Δ = first difference, ECT = error correction term, p = lag length, ECT_{it} = long-run model estimated residuals from Eq. 2, $\mu_{i,j}$ = long-run equilibrium.

Model specification: There are several scholars such as Abidin *et al.* (2014a) and Dao (2014) study the relationship between export and economic growth. To investigate the impact of exports on other macroeconomic factor in Malaysia and OIC countries from the year 1995-2012 this study employs the specific model followed by pervious literature as:

$$\ln TRADE_{it} = \alpha_i + \beta_1 \ln PCGDP_{it} + \beta_2 \ln PCGDP_{jt} + \beta_3 \ln CPI_{it} + \beta_4 \ln CPI_{jt} + \beta_5 \ln ER_{it} + \beta_6 \ln ER_{jt} + \beta_7 \ln FDI_{it} + \beta_8 \ln FDI_{jt} + \varepsilon_t \quad (17)$$

Where:

$Trade_{ijt}$ = Trade between Malaysia (country i to country j)
$PCGDP_{it}$ = Per capita gross domestic product of Malaysia
$PCGDP_{jt}$ = Per capita gross domestic product of country j
CPI_{it} = Consumer price index of Malaysia
CPI_{jt} = Consumer price index of country j
ER_{it} = Real effective exchange rate of Malaysia
ER_{jt} = Real effective exchange rate of country j
FDI_{it} = Foreign direct investment of Malaysia
FDI_{jt} = Foreign direct investment country j
B = Coefficient
ε_t = Error term

Data sources: All observations are based on annual data. The data used are in real terms. Data on Gross Domestic Product (GDP), GDP per capita, Foreign Direct Investments (FDIs), real exchange rates, total exports, total imports are obtained from the World Development Indicators (WDI) database of the World Bank and also from the International Financial Statistics (IFS), CD-ROM database and website of International Monetary Fund (IMF). Data on Malaysia's exports (country i export) to all other countries (country j's), Malaysia's imports (country i imports) from all other countries (country j's) are obtained from the Direction of trade statistics, CD-ROM database and website of International Monetary Fund (IMF).

Data on the distance (in kilometer) between Kuala Lumpur (capital of Malaysia) and other capital cities of country j are obtained from an Indonesian website: www.indo.com/distance. The data on Consumer Price Index (CPI) of all the Muslim countries are collected from the World Development Indicators (WDI) database of the World Bank and the Center of Advanced Research and Studies of the Islamic Common Market website: www.carsicm.ir. For the measurement of the level of institutional quality, that is measured by the corruption index is obtained from the Corruption Perceptions Index (CPI) from Transparency International (TI) and retrieved from TI database at www.transparency.org/cpi.

RESULTS

To test the panel unit root of each variable ($LNTRADE_{ijt}$, CPI_{it}, CPI_{jt}, Er_{it}, Er_{jt}, FDI_{it}, FDI_{jt} $PCGDP_{it}$, $PCGDP_{jt}$), the test proposed by Maddala and Wu (1999), Levin *et al.* (2002) and Im *et al.* (2003) have been applied. The results of panel unit root test reported in Table 3. Results are divided into four panels, panel A consists of results from the Levin *et al.* (2002), panel B consists of the results from Im *et al.* (2003), panel C consists of the results from ADF Fisher Chi square and panel D consist of the results from Phillips and Perron (1988) Chi Square. In panel unit root test results are based on majority.

Table 3: Unit root test results

Panels	Level	First difference
Panel A: Levin, Lin and Chu test		
LNCPIit	0.000*	
LNCPIjt	0.7966	0.000*
LNERit	1.000	0.000*
LNERjt	0.9812	0.000*
LNFDIit	1.000	0.000*
LNFDIjt	0.0001*	
LNPCGDPit	1.000	0.000*
LNPCGDPjt	1.000	0.000*
LNTRADEijt	0.4646	0.000*
Panel B: Im, Pesaran and Shin W-test		
LNCPIit	1.000	0.000*
LNCPIjt	1.000	0.000*
LNERit	0.3216	0.000*
LNERjt	0.9812	0.000*
LNFDIit	0.0303*	
LNFDIjt	0.5852	0.000*
LNPCGDPit	1.000	0.000*
LNPCGDPjt	1.000	0.000*
LNTRADEijt	1.000	0.000*
Panel C: ADF Fisher Chi square		
LNCPIit	1.000	0.000*
LNCPIjt	0.4925	0.000*
LNERit	0.9995	0.000*
LNERjt	0.9435	0.000*
LNFDIit	0.9842	0.000*
LNFDIjt	0.2069	0.000*
LNPCGDPit	1.000	0.000*
LNPCGDPjt	1.000	0.000*
LNTRADEijt	0.9998	0.000*
Panel D: PP Fisher Chi square		
LNCPIit	1.000	0.000*
LNCPIjt	0.0004*	
LNERit	0.000*	
LNERjt	0.9686	0.000*
LNFDIit	0.000*	
LNFDIjt	0.0032*	
LNPCGDPit	1.000	1.000*
LNPCGDPjt	1.000	0.000*
LNTRADEijt	0.9803	0.000*

*Significant at 1% critical value

According to all four test variables CPI_{it}, CPI_{jt}, ER_{it}, ER_{jt}, $Trade_{ijt}$, $PCGDP_{it}$, $PCGDP_{jt}$, FDI_{it}, FDI_{jt} are non-stationary at level and become stationary at first difference. Finally, these results shows that most of the variables are stationary at first difference I (1) hence conventional estimation methods of panel data are not applicable here. This study will construct the panel data model method which is robust to First difference I (1) stationary variables.

Panel cointegration test results: As panel unit root test results are concluded that series are integrated with the same order I (1) study proceed to test Cointegration. Thus the second step explores the long-run equilibrium relationship among export and other macroeconomic variables. Results of Kao's Cointegration are reported in Table 4. The results are stated that trade and other proposed variables are cointegrated within the panel of 55-OIC countries.

Hence according to the p-value, there is cointegration among the selected set of variables using the Kao residual method.

FMOLS results: As it is prove that there is cointegration among nine variables $Trade_{ijt}$, $PCGDP_{it}$, $PCGDP_{jt}$, CPI_{it}, CPI_{jt}, ER_{it}, ER_{jt}, FDI_{it}, FDI_{jt} study further can explore the long-run relationship by cointegration vector using panel Cointegration techniques. The results of FMOLS are reported in Table 5.

These results show that out of all the variables included in the model, PCGDP of Malaysia, foreign direct investment of Malaysia and real exchange rate of Malaysia has significant effect on the exports.

ECM residual test: After performing FMOLS it is important to confirm the stationary of the model. If the model show non-stationary than it cause spurious regression. The results of ECM residual test are reported in Table 6.

According to the unit root test of the residuals of FMOLS model without trend and intercept formation, it can be confirmed that the long run results are not spurious.

Table 4: Results of Kao's residual cointegration

Test	t-statistic	p-value
ADF	2.470313	0.0067

Table 5: FMOLS test

Variables	Coefficient	Std. error	t-value	p-value
$LNPCGDP_{it}$	2.582200	0.981670	2.630414	0.0092
$LNPCGDP_{jt}$	-0.166148	0.466658	-0.356039	0.7222
$LNFDI_{it}$	3.850500	0.065182	2.121320	0.0005
$LNFDI_{jt}$	0.028277	0.078922	0.358293	0.7205
$LNCPI_{it}$	-0.357947	3.024937	-0.118332	0.9059
$LNCPI_{jt}$	-0.072132	0.445010	-0.162091	0.8714
$LNER_{it}$	-3.868714	1.967560	-1.966250	0.0056
$LNER_{jt}$	0.756270	0.620896	1.218031	0.2246

*Results are significant at 5%

Table 6: Results of ECM residual

	Level		First difference	
Test	t-statistics	p-values	t-statistic	p-value
Levin, Lin and Chu test	-8.26255	0.000	-16.7572	0.000
ADF Fisher Chi square	108.07900	0.000	236.030	0.000
PP Fisher Chi square	119.79900	0.000	238.245	0.000

Panel ECM model: After confirmed the long-run relationship panel ECM were applied to explore the short-run relationships among all variables. Results of panel ECM are reported in Table 7.

According to the short run results, it is anticipated that there is convergence in the long run equilibrium which is depicted by Table 7. If there is 1% disequilibrium then trade between Malaysia and OIC country will respond 0.46% each time period to restore the equilibrium. Hence it takes 2.16 time periods to restore the equilibrium. From the short run variables it is observed that none of the variables are causing trade between Malaysia and OIC countries in short run.

Panel Granger causality tests: Granger causality test were applied to confirmed the direction of causality of all variables. The results of Granger causality are tabulated in Table 8.

Using the Granger causality test it is confirm that only CPI of Malaysia, per capita GDP of Malaysia and FDI of OIC countries are significantly causing trade between Malaysia and OIC countries.

Table 7: Results of panel ECM (dependent variable ΔLNTRADE)

Variables	Coefficient	Std. error	t-value	p-value
$\Delta LNPCGDP_i$	0.335249	0.518968	0.645991	0.5190
$\Delta LNPCGDP_j$	0.432620	0.353913	1.222390	0.2230
$\Delta LNFDI_i$	0.036795	0.021948	1.676459	0.0952
$\Delta LNFDI_j$	0.001279	0.038041	0.033617	0.9732
$\Delta LNCPI_i$	1.628044	2.586875	0.629348	0.5298
$\Delta LNCPI_j$	-0.073251	0.704408	-0.103990	0.9173
$\Delta LNER_i$	-0.961933	0.954281	-1.008019	0.3147
$\Delta LNER_j$	-0.430052	0.439156	-0.979271	0.3286
ECM (-1)	-0.461564	0.047439	-9.729569	0.0000
C	0.095938	0.074279	1.291592	0.1980

Results are significant at 5%

Table 8: Results of Granger causality

Direction of causality	p-value	Lags	Decision	Outcome
ER_j>$TRADE_{ijt}$	0.8509	2	Do not reject null	ER_j does not cause $TRADE_{ijt}$
$TRADE_{ijt}$ >ER_j	0.6573	2	Do not reject null	$TRADE_{ijt}$ does not cause ER_j
ERi> $TRADE_{ijt}$	0.0002	2	Do not reject null	ER_i does not cause $TRADE_{ijt}$
$TRADE_{ijt}$ >ER_i	0.8886	2	Do not reject null	$TRADE_{ijt}$ does not cause ER_i
CPI_i> $TRADE_{ijt}$	0.0050	2	Reject null	CPI_i does cause $TRADE_{ijt}$
$TRADE_{ijt}$ >CPI_i	0.2115	2	Do not reject null	$TRADE_{ijt}$ does not cause CPI_i
CPI_j> $TRADE_{ijt}$	0.7050	2	Do not reject null	CPI_j does not cause $TRADE_{ijt}$
$TRADE_{ijt}$ >CPI_j	0.0014	2	Reject null	$TRADE_{ijt}$ does cause CPI_j
$PCGDP_i$> $TRADE_{ijt}$	0.0106	2	Reject null	$PCGDP_i$ does cause $TRADE_{ijt}$
$TRADE_{ijt}$ >$PCGDP_i$	0.0737	2	Do not reject null	$TRADE_{ijt}$ does not cause $PCGDP_i$
$PCGDP_j$> $TRADE_{ijt}$	0.0501	2	Do not reject null	$PCGDP_j$ does not cause $TRADE_{ijt}$
$TRADE_{ijt}$ >$PCGDP_j$	0.7456	2	Do not reject null	$TRADE_{ijt}$ does cause $PCGDP_j$
FDI_i> $TRADE_{ijt}$	0.3591	2	Do not reject null	FDI_i does not cause $TRADE_{ijt}$
$TRADE_{ijt}$ >FDI_i	0.0921	2	Do not reject null	$TRADE_{ijt}$ does not cause FDI_i
FDI_j> $TRADE_{ijt}$	0.0095	2	Reject null	FDI_j does cause $TRADE_{ijt}$
$TRADE_{ijt}$ >FDI_j	0.0006	2	Reject null	$TRADE_{ijt}$ does cause FDI_j

Results are significant at 5%

DISCUSSION

Therefore, the result of this study is obtained through the empirical investigation of the model. Mainly, empirical investigation is based on FMOLS model but some preliminary tests are also performed to fulfill the assumptions of FMOLS. Before applying FMOLS, confirm the order of integration whether the variables are stationary or not and furthermore, investigate the order of integration that variables are stationary at level I(0) or at first difference I(1). Results show that all variables are non-stationary at level I(0) and become stationary after first difference I(1). These results were obtained by utilizing panel unit root tests proposed by Maddala and Wu (1999), Levin *et al.* (2002) and Im *et al.* (2003). In addition, the results of panel co-integration were shown that there is cointegration among all variable and the null hypothesis of no cointegration is rejected. The results are obtained through Kao (1999) panel cointegration method. The existence of cointegration opens up for further investigation because if at that point there is no cointegration, then this model cannot be further investigated. For further investigation to achieve the ultimate goal which is to find out the long run relationship at this stage. Results of FMOLS shows that out of all the variables included in the model, per capita GDP, foreign direct investment and real exchange rate of Malaysia have significant effect on the trade. This result is consistent with the findings of Devadason *et al.* (2014) for the Malaysia. However, this finding contrast with Laldin (2008). ECM panel unit root test were applied to confirm the stability of FMOLS. According to the unit root test of the residuals of FMOLS model without trend and intercept formation, it can be confirmed that the long run results are not spurious. Results of panel ECM show that none of the variable effect on trade between Malaysia and OIC countries. Finally, results of Granger causality show that consumer price index, per capita GDP of Malaysia and foreign direct investment of OIC countries are causing trade between Malaysia and OIC countries. The results of long run relationship between CPI, GDP per capita of Malaysia and FDI of OIC countries and trade of Malaysia are consistent with the studies such as Abidin *et al.* (2014b), Abu-Hussin (2010) and Ab Rahman and Abu-Hussin (2009) but findings are contrast with Hasan (2011) and Ghani (2007).

CONCLUSION

This study attempts to explore the long run and short run relationship between trade and other macroeconomic variables of Malaysia and the OIC member countries during 1995-2012. For the purpose to find out panel long run relationship initially different unit root test such as Levin *et al.* (2002), Im *et al.* (2003), ADF Fisher Chi square and Phillips and Perron (1988) Chi square was applied. Furthermore, empirical investigation will be conducted based on the FMOLS. Results of FMOLS shows that out of all the variables included in the model, per capita GDP, foreign direct investment and real exchange rate of Malaysia have significant effect on the trade. The ECM panel unit root test were applied to confirm the stability of FMOLS. According to the unit root test of the residuals of FMOLS model without trend and intercept formation, it can be confirmed that the long run results are not spurious. Results of panel ECM show that none of the variable effect on trade between Malaysia and OIC countries. Finally, results of Granger causality show that consumer price index, per capita GDP of Malaysia and foreign direct investment of OIC countries are causing trade between Malaysia and OIC countries.

The empirical evidence indicates that Malaysian CPI and GDP per capita have positive impact on Malaysian trade. In addition, FDI of all OIC members' countries also shows positive contribution in the trade of Malaysia. In this regard Malaysian government should make policy to maintain the

CPI rate as well as GDP per capita. Further attracting more FDI is from the OIC member' countries also the part of policy to achieve the goal of enhance trade. The findings of this study are helpful for Malaysian government to formulate lucid and wide range trade and economic policies.

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